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Treatment Implications for Young Adult Users of MDMA

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## Abstract

MDMA use among young adults has become a national concern to public health officials and substance abuse treatment professionals. Although research on the epidemiology of MDMA use and its neurological impact has increased, there remains a lack of inquiry into intervention and treatment. In this article, results from an epidemiological investigation are examined from a clinical perspective. Survey results support the inclusion of MDMA dependence and abuse in the *DSM IV-TR*. Suggestions for mental health clinicians working with MDMA users are also provided.

### Treatment Implications for Young Adult Users of MDMA

MDMA (3,4-methylenedioxymethamphetamine), commonly known as Ecstasy, is currently one of the more popular recreational drugs in the Western world (Corapcioglu & Ogel, 2004; Schifano, 2004). A synthetic analog to amphetamine with hallucinogenic features similar to mescaline, MDMA is often described as an entactogen (defined as “to produce a touching within”) for its ability to heighten but not distort sensory perceptions (Gahlinger, 2004). Merck Pharmaceuticals developed MDMA in 1914 as an appetite suppressant. However, results from initial animal drug testing were inconclusive and MDMA was originally never tested on humans (Connor, 2004). In the 1960s and 1970s, MDMA was used to heighten sensory experience, both recreationally and psychotherapeutically. In 1965, psychiatrists began prescribing MDMA in order to enhance introspective states, communication, and intimacy (Martinez-Price, Thomson, & Geyer, 2002). However, in response to subsequent reports of neurotoxicity in 1985, MDMA was classified as a Schedule 1 controlled substance by the Food and Drug Administration (FDA); (i.e., no approved medical use, high abuse potential, and lack of accepted safety for use in medical purposes) and its use was made illegal (Freese, Miotto, & Reback, 2002).

MDMA has complex neuropharmacological effects through stimulating acute release of serotonin (Croft, Klugman, Baldeweg, & Gruzelier, 2001; Maartje et al., 2004), dopamine (Colado, O’Shea, & Green, 2004), noradrenaline (Back-Madruga et al., 2003), acetylcholine (Montoya, Sorrentino, Lukas, & Price, 2002), and histamine (Martinez-Price, Krebs-Thomson, & Geyer, 2002). Typical effects of MDMA use include a relaxed, euphoric state, teeth grinding (bruxism), jaw rigidity (trismus), emotional openness, increased empathy, extroversion, and physical energy, and a decrease in inhibitions (Pape & Rossow, 2004). Acute neuropsychiatric effects include moderate derealization, depersonalization, thought blocking, impaired decision-

making, and slight elevation in anxiety (Schifano, 2000). The physiological influences of MDMA use include hyperthermia, increased heart rate, and elevated blood pressure (Croft, Klugman, Baldeweg, & Gruzelier, 2001).

At higher or repeated doses, MDMA has been found to be neurotoxic to serotonin systems within the brain of primate and other animal species, resulting in a user's vulnerability to depression (Dafters, Hoshi, & Talbot, 2004; McGregor et al, 2003), anxiety (Dughiero, Schifano, & Forza, 2001; Parrot et al., 2002), impulsivity (Curran, Rees, Hoare, & Bond, 2004; Moeller et al., 2002; Morgan, 1998), and other mood impairment (Maartje et al., 2004; McCardle, Luebbbers, Carter, Croft, & Stough, 2004). Chronic MDMA users report short-term and long-term memory deficits (McCardle et al., 2004) and greater risk of immunosuppression (Connor, 2004), and acquiring Parkinson's disease (Kuniyoshi & Jankovic, 2003). Research also suggests that physical and psychological morbidity (e.g., depression, anxiety, and heightened mood swings) from this drug is increasing, especially among adolescents and young adults (Broening, Morford, Inmn-Wood, Fukumura, & Vorhees, 2001; Rowe, Liddle, Greenbaum, & Henderson, 2004).

The 2002 National Survey on Drug Use and Health (SAMSHA, 2003) found reported lifetime use of MDMA among individuals between the ages of 18 and 25 to be 15.1%, past year use to be 5.8%, and last month use to be 1.1%. Furthermore, individuals 18 to 25 years old comprised nearly two-thirds of all ecstasy users (SAMSHA, 2002). Similar results among individuals between the ages of 14 and 25 years were found in the 2002 National Institute on Drug Abuse's (NIDA, 2003) Monitoring the Future (MTF) survey (13.5% lifetime, 5.6% past year, 1.2% past month, respectively). High percentages of MDMA use among undergraduate students were found in several university-specific surveys (McCabe, Boyd, & Huges, 2003; Walters, Foy, & Castro, 2002). In a sample of 1,264 undergraduate students at a private southern

university, Cuomo and Dymont (1994) found that 24% of participants reported using ecstasy in the previous 4 years. These results indicate a high prevalence of MDMA use among young adults, thereby highlighting the need for further examination of this at-risk age group.

Although research on the epidemiology of MDMA use among young adults is increasing (NIDA, 2003; Yacoubian, Boyle, Harding, & Loftus, 2003), there continues to be scant inquiry into intervention and treatment. Confounding issues that have hindered these efforts to research MDMA have included prevalence of alcohol and illicit drug use, especially cannabis (Daumann et al., 2004), infrequent identification of MDMA as a primary drug of choice by both the user and researcher (Jansen, 1999; Boeri, Sterk, & Elifson, in press), and perceived low risk associated with MDMA use (Falk, Carlson, Wang, & Siegal, 2004). However, the potential side effects of MDMA are particularly deleterious to adolescent and young adult users because of cerebral and hormonal vulnerabilities during the maturation process (Maartje et al., 2004; Schifano, 2000). In particular, early depletion of serotonin may perturb the developmental processes of the cerebral cortex, thereby interfering with life-long modulation of affect (Montoya, Sorrentino, Lukas, & Price, 2002). These risks make it especially important for all helping professionals to understand the unique risks, usage patterns, and intervention strategies for working with young adult MDMA users.

In this article, data from an epidemiological survey project are examined from an assessment perspective and suggestions for mental health professionals working with MDMA users are provided. The primary research questions and associated hypotheses addressed in this article include:

Research Question 1: What is the relationship between alcohol and/or illicit substance use and differing diagnostic criteria of young adult MDMA users?

- a. Gay and bisexual young adult users of MDMA are more likely to be dependent users of MDMA than heterosexual young adult users of MDMA.
- b. Young adult male users are more likely to be dependent MDMA users than young adult female users.
- c. Dependent users of MDMA will report higher levels of marijuana, methamphetamine, and cocaine use than recreational or abusing users of MDMA.

Research Question 2: Does the perception of risk associated with MDMA use differ by a user diagnostic classification?

- a. Dependent MDMA users are more likely to report greater risks associated with its use than recreational or abusing users.

Research Question 3: Are dependent users of MDMA more likely to view chemical dependency treatment more negatively than recreational or abusing MDMA users?

- a. Dependent users of MDMA are more likely to believe substance abuse treatment is too demanding than recreational and abusing MDMA users.
- b. Dependent users of MDMA are more likely to view chemical dependency treatment as not working than recreational and abusing MDMA users.

## Methods

### *Study Procedures*

Community identification (CID) methods were used to develop targeted sampling strategies in a population of young adult Ecstasy users in a major metropolitan area in the southeast (Tashima, Crain, O'Reilly, & Sterk-Elifson, 1996). Epidemiological indicators of prevalence and at-risk groups were identified via emergency rooms admissions, law enforcement

statistics, and expert opinions from local public health and political leaders. Persons eligible for the study had to meet the following criteria: (a) have used MDMA at least on four separate occasions in the past 90 days, (b) not currently in substance abuse treatment, (c) no acute cognitive impairment by drug and/or alcohol use at time of interview, including no alcohol and drug use within the past 24 hours (no confirmatory drug analyses were conducted, and (d) between the ages of 18 and 25.

All interviewers were screened and selected by this study's primary investigator. The interviewers were all graduate-level students in sociology, public health, and psychology. Prior to the collection of any data, all interviewers were trained by the primary investigator regarding ethical guidelines, participant safety, qualitative research strategies, interviewing data collection, confidentiality, informed consent, and logistical concerns.

Ethnographic recruitment techniques were used to access multiple communities and social settings. This approach allowed the field team to introduce the study to a variety of MDMA users in geographic areas with higher concentrations of young adults. Outreach staff recruited potential respondents in two primary ways. The first method consisted of direct communication with potential participants in the setting where they were recruited such as raves, clubs, parks, near college dorms, or off-campus student housing. The candidate was informed of the purpose of the study and assessed for potential interest. If interested, the individual was given a short form in order to screen for eligibility. Nearly 6 out of 10 participants ( $n = 162$ ) were obtained via this method. The second outreach technique involved passive recruitment, whereby flyers containing information about the study and a telephone number to contact if interested were posted in venues highly populated by young adults (e.g., colleges and universities, coffee shops, nightclubs, and other social establishments). Potential respondents who called the project

phone line were screened for eligibility and reminded of the voluntary nature of the research. If a respondent met the criteria and was interested in participating, a mutually agreed upon date and time was established. This second method of outreach resulted in nearly 40% ( $n = 106$ ) of total participants.

Individual face-to-face interviews were held at such venues as the participant's home, local restaurant, coffee shop, community centers, or the interviewer's car. An additional review of the screening criteria was performed prior to the commencement of the interview. Approved consent forms were signed prior to data collection. Average length of time to complete the structured questionnaire was 2 hours (range = 1 – 3.5 hours). A stipend of \$25.00 was paid to the participant when all the study protocols had been completed.

### *Study Sample*

The sample in the present analysis consisted of 268 actively using young adult MDMA users (age:  $M = 20.82$  years,  $SD = 2.36$ , range = 18-25 years). Sixty-nine percent were male, 51% self-identified as White, and 82% self-identified as heterosexual. Using MDMA more than the minimum four times in the past 90 days was common among more than 90 percent of the sample ( $M = 14.29$  days,  $SD = 13.13$ , range = 4-90 days). Route of administration used in the past 90 days was oral ( $n = 268$ , 100%), followed by snort/intranasal ( $n = 77$ , 28.7%), smoke ( $n = 16$ , 6%), and injection ( $n = 3$ , 1.1%). In response to the question, "How many times in your life have you used Ecstasy?", half ( $n = 134$ ) of the participants self-reported life time MDMA use of more than 100 pills, whereas 34% ( $n = 94$ ) reported a lifetime total of less than 50 pills. Twenty-two percent ( $n = 58$ ) of respondents identified MDMA as their current drug of choice compared to 55% ( $n = 138$ ) choosing marijuana as a preferred drug.



### *Measures*

Formative results from a pilot study with a similar MDMA-using population created specifically for this study were obtained. All of the obtained data were based on self-reports. A structured survey based on the following validated instruments was used: (a) Depressive Experiences Scale (Blatt, D’Afflitti, & Quinlan, 1976), (b) Locus of Control Scale (Levenson, 1981), (c) Social Avoidance and Distress Scale (Watson & Friend, 1969), and (d) Revised Shyness Scale (Cheek & Buss, 1981). This instrument also included a variety of socio-demographic measures, including age, racial background, educational achievement, high school completion, current socio-economic status, current employment status, homelessness, sexual orientation, and relationship status. A participant’s past and current use of MDMA was extensively evaluated. The respondent’s first use of MDMA was assessed by age, route of administration (inject, smoke, snort, and swallow), amount taken, and perceived potential side effects. Information on frequency, amount of use, route of administration, and money spent on MDMA in the past 90 days was also obtained. With regard to a participant’s history of MDMA use (i.e., frequency, amount, route of administration, and money spent), all interviewers used open-ended questions to obtain information. Additional questions regarding MDMA use included dichotomous (yes/no) choices related to environment (e.g., “Have you ever taken ecstasy at your own place with no party going on?” “Have you ever taken ecstasy at a party, club, or rave?”), ordinal assessment of the MDMA “high” (ranging from 1 = “much worse than you expected it to be” to 6 = “much better than you expected it to be”), and dichotomous (yes/no) effects of current MDMA use (e.g., “In the past 90 days, have you experienced anxiety due to your ecstasy use?” “In the past 90 days, have you experienced hallucinations due to your ecstasy use?”).

History of MDMA booster doses and binge use was obtained via dichotomous (yes/no) and ordinal (ranging from 1 = “less than a month” to 6 = “almost every day”) answers.

Relationships between MDMA use and attitudes toward music, lighting, and sensory experiences was assessed using ordinal scales (ranging from 1 = “strongly disagree” to 5 = “strongly agree”).

Perceived risk associated with MDMA use (e.g., “How likely is it that ecstasy may cause brain damage?” “How likely is it that ecstasy may cause memory problems?”) was also obtained via ordinal scales (ranging from 1 = “very likely” = 1, to 5 = “very unlikely”).

A thorough drug history was also obtained for alcohol, crack cocaine, powder cocaine, heroin, oxycontin, other prescription pills, methamphetamine, amphetamines, hallucinogens, marijuana, GHB, and ketamine. Information related to age of first use was gathered in order to ascertain a time-sequential order of substance use. The frequency (number of days), quantity used, method of administration (inject, smoke, snort, and swallow), and money (dollar amount) spent on each drug in the last 90 days was acquired. Previous substance abuse treatment and/or counseling were assessed and specific drugs for which respondents previously sought treatment was considered (e.g., “Have you ever sought treatment or counseling for problems with alcohol?” “Have you ever sought treatment or counseling for problems with methamphetamine?”). Current views regarding the efficacy of substance abuse treatment were evaluated by the following 5 questions: “If you wanted to get off drugs would you feel: (a) being in a treatment program is too demanding, (b) you have too many other responsibilities now to be in a treatment program, (c) it will be hard for you to resist drugs or alcohol where you currently live, (d) your old friends may try to get you to drink or use again, and (e) drug and alcohol treatment just doesn’t work.”

The 7 criteria of the *Diagnostic and Statistical Manual IV-TR* (DSM-IV-TR) diagnosis

(American Psychiatric Association, 2000) for generic substance dependence were assessed via dichotomous (yes/no) questions (e.g., “In the past 12 months, has there been a period when you spent a great deal of time using ecstasy, getting ecstasy, or getting over its effects?” “In the past 12 months, have you often used larger amounts of ecstasy or used for a longer period of time than was intended?”). One point was added to the overall scale for each affirmative answer. The scores could range from 0 to 7, and the scale was found to be reliable (Cronbach’s  $\alpha = 0.79$ ). This approach allowed for the trichotomization of respondents into three groups: dependence (positive answers to 3 or more questions), abuse (one or two positive responses) or recreational use (no affirming answers). Diagnostic assessment for substance dependence other than MDMA use was not conducted.

### *Statistical Analysis*

The main purpose of the analyses was to assess the use of MDMA and other substances, evaluate self-perception of risk related to MDMA use, and determine attitudes toward substance abuse treatment among a cohort of young adult MDMA users. Analysis started with frequency distributions of socio-demographic characteristics, drug usage, and psychosocial variables. Evaluation of baseline data regarding *DSM IV-TR* criteria for substance abuse and dependence allowed for the classification of MDMA users into dependent, abusing, and recreational users. To address research question 1, Pearson’s chi square statistics were used to analyze relationships between dichotomous variables (gender, race, sexual orientation, etc.) and dependent, abusing, and recreational levels of MDMA use. Fisher’s exact test was used for examining associations with inadequate cell sizes to conduct a chi-square test. To examine research questions 2 and 3, Mantel-Haensezel chi square analysis were conducted to assess the relationship between ordinal variables such as the perceived risk associated with MDMA use (1= very unsafe to 5 = very safe;

1 = very likely to 5 = very unlikely) and varying diagnostic categories of MDMA use. However, if the relationship between the ordinal variables and MDMA use was not linear, Pearson's chi square testing was also performed. All analyses were two-tailed and a p-value of equal to or less than 0.05 was considered significant.

## Results

Sociodemographic characteristics of respondents according to classification of MDMA usage are presented in Table 1. There was no significant difference among recreational, abusing, or dependent young adult MDMA users in age,  $\chi^2 (14, N = 268) = 11.80, p = .62$ ; gender,  $\chi^2 (2, N = 268) = 1.375, p = .50$ ; racial background,  $\chi^2 (10, N = 268) = 7.21, p = .71$ ; employment status,  $\chi^2 (6, N = 268) = 3.33, p = .76$ ; or sexual orientation  $\chi^2 (4, N = 268) = 2.01, p = .73$ . Therefore hypotheses "a" and "b" of research question 1 were not supported. Of the 268 respondents, 84 (31.3%) reported having been homeless at least once in their lives, whereas 31 (11.6%) participants identified themselves as homeless in the previous 6 months. Nearly 3 out of every 10 respondents dropped out of high school before the age of 18. It was observed that MDMA dependence was significantly higher in individuals who either reported dropping out of high school,  $\chi^2 (2, N = 268) = 5.86, p = .048$  or acknowledged recent homelessness,  $\chi^2 (10, N = 268) = 18.44, p = .049$ .

Lifetime prevalence of substance use other than MDMA was as follows: alcohol (99.2%), marijuana (98.5%), hallucinogens (62.7%), methamphetamine (49.3%), powder cocaine (38.1%), ketamine (35.4%), amphetamine (31.0%), oxycontin (23.5%), GHB (22.8%), crack cocaine (20.1%), and heroin (15.7%). Dependent users of MDMA were more likely to have reported lifetime use of heroin,  $\chi^2 (2, N = 268) = 6.56, p = .05$ ; methamphetamine,  $\chi^2 (2, N = 268) = 6.63, p = .048$ ; and ketamine,  $\chi^2 (2, N = 268) = 6.61, p = .05$ , than abusing or recreational users of MDMA. As a

result, the only component of hypothesis “a” that was supported in this research was the relationship between MDMA dependent users and methamphetamine use. The relationships between MDMA and both marijuana and cocaine were not supported. Compared to lifetime use, there was no significant relationship between the classification of MDMA user and other substance use (including alcohol) in the past 90 days. For example, over 86% of all respondents had used marijuana in the previous three months, nearly 37% had used psychoactive stimulants such as powder cocaine and methamphetamines, and approximately 3 out of every 10 respondents used hallucinogens in the same period. On average, respondents’ history of illicit drug use began with marijuana ( $M = 14.34$  years of age), followed by hallucinogens ( $M = 16.66$ ), powder cocaine ( $M = 17.54$ ), ecstasy ( $M = 17.84$ ), and methamphetamine ( $M = 18.16$ ). Although no significant differences were found between age of first-time use of any illicit substance and the trichotomous classification of MDMA users, MDMA dependent respondents did report earlier use of each of the aforementioned drugs than abusing or recreational users.

In addition to assessing past and current drug use, assessment of perceived risk related to MDMA was also obtained. Nearly half of all respondents ( $N = 118$ ) viewed the use of MDMA as either unsafe or very unsafe whereas only a quarter of all participants ( $N = 68$ ) described MDMA as safe or very safe (see Figure 1). Dependent young adult MDMA users were the most likely to describe MDMA use as very unsafe ( $\chi^2 [8, N = 268] = 16.34, p = .05$ ), thereby supporting the hypothesis for research question 2. Furthermore, respondents in the dependent category more often viewed MDMA as very likely to cause brain damage, heart problems, vision problems, memory problems, and depression than abusing or recreational users (see Table 4). The overall perception of risk associated with MDMA use was high. At least half of all respondents reported

that MDMA may cause memory problems (72.8%), brain damage (67.2%), depression (64.2%), heart problems (61.6%), and death (50.0%).

Attitudes toward substance abuse treatment were also investigated in this sample of MDMA young adult users. A quarter ( $n = 67$ ) of all respondents reported previous substance abuse treatment, for which the majority had entered an inpatient or alcohol rehabilitation facility (58.2%). Drugs for which participants sought treatment included the following: marijuana ( $n = 37$ ), alcohol ( $n = 25$ ), powder cocaine ( $n = 20$ ), heroin ( $n = 17$ ), and MDMA ( $n = 10$ ). Most participants were able to enter drug treatment; however, a majority (52.9%) of those not able to receive help cited “no treatment for MDMA users” as a primary reason. Nearly 80% of respondents ( $n = 212$ ) disagreed with the statement, “drug and alcohol treatment just doesn’t work,” and two-thirds ( $n = 177$ ) of participants did not perceive being in a treatment program as too demanding. Dependent users of MDMA most often cited the influence of social/peer pressure as a hindrance to maintaining abstinence ( $\chi^2 [2, N = 268] = 10.08$   $p = .006$ ). No significant relationships between varying classification of MDMA user and negative attitudes toward substance abuse treatment were reported. Therefore, hypotheses “a” and “b” for research question 3 were not supported.

### Discussion

Substance abuse treatment professionals historically have discounted the severity and negative consequences of MDMA use (Sydow, Lieb, Pfister, Hofler, & Wittchen, 2002). However, results from an emerging body of literature highlight the detrimental neurological, and physiological effects of MDMA use, especially among young adults. This study is the first population-based examination of young adult users of MDMA focusing on the prevalence of MDMA and other drug use (including alcohol), perceived risks associated with MDMA, and

attitudes toward substance abuse treatment. The inclusion of MDMA as stimulant in the DSM-IV-TR with specific classifications of substance abuse and dependence was justified by the findings of this research. Results from this study indicate that the criteria for stimulant dependence were met for a large percentage of this sample. For example, heavy users reported distinct withdrawal symptoms post-MDMA use, greater tolerance to MDMA over time, unsuccessful attempts to cut down or control MDMA use, and consuming larger amounts of MDMA than originally attended. These findings were supported by the prevalence and use patterns (life-time and past 90 days) of MDMA in this sample.

Several additional findings that challenge conventional wisdom conveyed in the literature should also be highlighted. First, in contrast to previous claims that MDMA use is mostly experimental (Solowij, Hall, & Lee, 1992), results from this study found that casual or weekend MDMA drug use for a majority of this sample was not supported. Although daily use was rare, lifetime use of more than 100 pills of MDMA was not unusual ( $n=134$ ; 50%) among respondents. Second, MDMA is not limited to young adult white users as indicated by the ethnic composition of previous studies of young adult MDMA users (Heffernan, Jarvis, Rodgers, Scholey & Ling, 2001; Milani, Parrott, Turner, & Fox, 2004; Urbach, Reynolds, & Yacoubian, 2002). Only half of this sample self-identified as white, whereas nearly 36% of the sample was African-American. Although these socio-demographics may reflect the racial diversity found in a southeastern metropolitan area (U.S. Census, 2000), these findings support the epidemiological findings that use of MDMA is spreading into varying ethnic minority groups, especially the African-American community (Theall, Green, Kachur, & Elifson, 2001). Third, the perception that MDMA use is limited to rave parties, dance clubs, and circuit parties was unsubstantiated (Boeri et al., in press; Yacoubian, Boyle, Harding, & Loftus, 2003). Use of MDMA at school,

work, or at home was reported by a majority of respondents. Finally, the opinion that the frequency of MDMA use is higher in the gay or bisexual community than in the heterosexual community was also not supported (Klitzman, Greenberg, Pollack, & Dolezal, 2002; Ross, Mattison, & Franklin, 2003). Heterosexual respondents in this study did not use MDMA more often, nor did they report greater problems associated with MDMA use, than gay, lesbian, or bisexual participants.

Although high rates of other drug consumption among MDMA users were similar to previous studies (Dafters, Hoshi, & Talbot, 2004; Daugmann, Pelz, Becker, & Tuchtenhagen, 2001), specific findings from this investigation provide unique insight for treatment professionals working with MDMA users. The high prevalence of marijuana use among MDMA users was not surprising. However, the fact that nearly two-thirds of MDMA users reported lifetime use of hallucinogens, a drug that on average is consumed by less than 5% of young adults (SAMSHA, 2003), is more dramatic. Use of hallucinogens may be a precursor to MDMA use, as fewer respondents reported use of hallucinogens in the past 90 days. In addition, although a large number of MDMA users met the criteria for substance dependence, only 20% of respondents identified MDMA as their primary drug of choice. On one hand, these findings support the claim that MDMA use can be recognized as problematic by its user(s) and therefore, deserves specific clinical protocol to assist in intervention efforts. On the other hand, higher amounts and frequency of MDMA use were not related to MDMA being identified as the respondent's primary drug of choice. Consequently, substance abuse assessment and screening professionals may not always be able to rely on client self-reports to prioritize problematic use of drug perceived to possess less stigma than other drugs (e.g., cocaine, heroin, and methamphetamine). These clinicians should include a separate evaluative category for MDMA use, while specifically



focusing on age of first use, progression, current patterns, money spent on the drug, withdrawal symptoms, and tolerance.

Intervention efforts in the last 3 years have attempted to provide education about the harmful effects of MDMA use (Schifano, Leoni, Martinotti, Rawaf, & Rovetto, 2003; Youcoubian et al., 2004). These attempts have had mixed results in this sample of young adults. Results from this study indicate that either education about harmful effects may not be getting to these MDMA users or these participants are choosing to ignore them. Less than half of the sample described MDMA use as likely or very likely to cause harm. Furthermore, MDMA dependent participants were most likely to cite higher risk in using this drug. Individuals with higher consumption of MDMA may have already experienced memory problems, depression, and anxiety, and possibly were more familiar with its negative impact. As research is increasingly supporting the potential short-term and long-term risks of MDMA use, substance abuse treatment counselors need to continue educating clients on its unique risks.

Reports of admittance to substance abuse treatment for MDMA use were rare but were reported. Most respondents who sought previous treatment admission were able to receive either inpatient or outpatient services. What is disturbing, however, is that some MDMA users perceived substance abuse treatment facilities as not providing treatment for MDMA dependence. This finding suggests that MDMA users may perceive treatment facilities as lacking knowledge or consider MDMA use to be unworthy of treatment. MDMA users more likely will enter treatment for problems associated with use of other substances, particularly marijuana, alcohol, and powder cocaine. Yet, exploring how MDMA interacts with other substances, especially marijuana, is often ignored by substance abuse treatment professionals (Daugmann, Pelz, Becker, & Tuchtenhagen, 2001).

Despite significant findings, four limitations to our study should be considered. First, all data from this study were collected via uncorroborated self-reports, which may have been influenced by social desirability or the Hawthorne effect. Therefore, the accuracy with which respondents reported their involvement with substance use cannot be known. However, previous researchers in the substance abuse field have found high reliability and validity in self-reported data from similar populations (Anglin, Hser, & Chou, 1993; Higgins et al., 1995; Miller, Turner, & Moses, 1990). A second potential limitation relates to recall bias. Respondents were asked to describe alcohol and illicit drug use and an array of beliefs and attitudes in time periods ranging from present day, within past 90 days, and over a lifetime. The exact influence of how recall bias might influence the data cannot be determined. A third possible limitation is the sampling strategy used in data collection. Because all data were obtained from individuals residing one southeastern metropolitan area, results may not be generalizable to other regions of the United States, as well as to more suburban and rural areas of this Southern state. Furthermore, this study is not necessarily representative of all MDMA users in this particular city because a random sample was not drawn. Interviews were also conducted at various locations which could enhance standardization concerns. The survey did, however, recruit participants from diverse settings and at varying times of day in order to increase the representativeness of the sample. Finally, one cannot ignore the confounding influence of additional substance use, especially marijuana, on this sample. Attempts were specifically made to isolate the effects of MDMA use. However, even when assessing specifically for MDMA use, it was difficult to determine if the consequences were a result of MDMA use or were they influenced by use of other substances.

Additional research is needed to enable substance abuse treatment professionals to assist more effectively their young adult MDMA using clients. Longitudinal studies that follow a

cohort of dependent, abusing, and recreational MDMA users over time are needed to ascertain short-term and long-term consequences. Assessment of counselors' knowledge of MDMA (e.g., pharmacology and mechanism of action) and its neurological, psychological, and physical impact on the user is also needed. Evaluation of intervention strategies, including specific goals and objectives, individual and group paradigms, and effective aftercare planning, with MDMA users is recommended. Finally, intervention strategies that target at-risk groups of young adults need to be identified, implemented, and evaluated. For example, the Internet, a site commonly frequented by young adults, could be used to elucidate the risks associated with MDMA use, as well as suggest treatment suggestions.

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Table 1  
Sociodemographic characteristics of participants according to MDMA using status ( $N = 268$ )

	Recreational (%) ( $N = 46$ )	Abuse (%) ( $N = 110$ )	Dependence (%) ( $N = 112$ )	<i>P Value</i>
Age				NS
18-19	32.6	40.9	42.9	
20-21	26.1	20.9	22.3	
22-23	23.9	20.9	12.5	
24-25	17.4	17.3	22.3	
Gender				NS
Female	28.3	34.5	27.7	
Male	71.7	65.5	72.3	
Race				NS
African-American	37.0	38.2	33.0	
White	50.0	50.9	50.0	
Latino	0.0	2.7	3.6	
Native American	2.0	0.9	0.0	
Other	10.9	7.3	13.4	
High school drop out (% Yes)	17.4	26.4	35.7	*
Ever homeless (% Yes)	23.9	29.1	36.6	*
Present employment Status				NS
Full time	32.6	20.9	25.9	
Part time	32.6	40.9	35.7	
Unemployed	19.6	25.5	23.2	
Student (only)	15.2	12.7	15.2	
Sexual orientation				NS
Heterosexual	87.0	79.1	82.1	
Homosexual	8.7	10.0	8.0	
Bisexual	4.3	10.9	9.8	
Relationship Status				NS
Single	41.3	39.1	38.4	
Separated, divorced	2.2	0.9	0.0	
Married	4.3	0.0	0.0	
Living with partner	19.6	11.8	16.1	
Steady relationship (non-cohabitation)	23.9	28.2	24.1	
Casual relationship (non-cohabitation)	8.7	20.0	21.5	

\*  $P < 0.05$

Table 2  
 Substance use of participants according to MDMA using status ( $N = 268$ )

Substance History	Recreational (%) ( $N = 46$ )	Abuse (%) ( $N = 110$ )	Dependence (%) ( $N = 112$ )	<i>P Value</i>
Life Time Use (% Yes)				
Alcohol	98.3	99.1	99.3	NS
Crack Cocaine	17.4	18.2	23.2	NS
Powder Cocaine	52.2	58.2	69.6	*
Heroin	10.9	12.7	20.5	*
Oxycontin	17.4	24.5	25.0	NS
Methamphetamine	43.5	44.5	56.3	*
Amphetamine	30.4	31.8	30.4	NS
Hallucinogen	63.0	60.9	64.3	NS
Marijuana	95.7	99.1	99.1	NS
GHB	19.6	21.8	25.0	NS
Ketamine	34.8	29.1	42.0	*

\*  $P < 0.05$

Table 3  
 Illicit Drug Use by Extent of MDMA Using Status (Past 90 Days)

Substance History	Recreational ( <i>N</i> = 46)	Abuse ( <i>N</i> = 110)	Dependence ( <i>N</i> = 112)	Total	<i>P Value</i>
Powder Cocaine	12/(1-90) 26.1	34/(1-75) 30.9	52(1-35) 46.4	98(1-90)36.6	NS
Heroin	2/(14-90) 4.3	4/(15-90)3.6	11(1-90) 9.9	17(1-90) 6.3	NS
Oxycontin	2/(2-5) 4.3	6/(1-6) 5.4	12(1-20) 10.7	20(1-20) 7.4	NS
Methamphetamine	17(1-80) 40.0	33(1-60) .30	46(1-90) 41.0	96(1-90) 35.8	**
Amphetamine	3(2-90) 6.5	7(1-90) 15.4	16(1-90) 6.0	26(1-90) 9.7	NS
Hallucinogen	13(1-10) 28.2	32(1-45) 29.1	32(1-43) 28.6	77(1-45) 28.7	NS
Marijuana	41(1-90) 89.1	83 (1-90) 75.4	107(1-90) 95.5	231(1-90) 86.2	NS
GHB	4(1-21) 8.7	6(1-5) 5.4	8 (1-10) 7.1	18(1-21) 6.7	NS
Ketamine	10(1-8) 21.7	8(1-12) 7.2	18 (1-15) 16.1	36(1-15)13.4	*

\*  $P < 0.05$

\*\*  $P < 0.01$

<sup>a</sup> Percentage of total recreational, abuse or dependent users

Table 4  
Perceived Risk Associated with MDMA by MDMA drug using group

MDMA Using Classification	Recreational ( <i>N</i> = 46)	Abuse ( <i>N</i> = 110)	Dependence ( <i>N</i> = 112)	Total ( <i>N</i> = 268)	<i>P</i> Value
Overall safety <sup>a</sup> :	3.08	3.25	3.53	3.34	*
Brain damage <sup>b</sup>	1.35	1.30	1.22	1.27	NS
Sterility <sup>b</sup>	2.17	1.90	2.05	2.01	NS
Memory Problems <sup>b</sup>	1.39	1.15	0.96	1.12	*
Heart Problems <sup>b</sup>	1.61	1.38	1.41	1.43	NS
Depression <sup>b</sup>	1.59	1.28	1.37	1.37	NS
Death <sup>b</sup>	2.04	1.60	1.61	1.68	NS

<sup>a</sup>Ordinal Scale (1 = Very Safe to 5 = Very Unsafe)

<sup>b</sup>Ordinal Scale (1 = Very Likely to 5 = Very Unlikely)

\* *P* Value < .05

Table 5  
Attitudes toward chemical dependency treatment by MDMA drug using group

MDMA Using Classification	Recreational ( <i>N</i> = 46)	Abuse ( <i>N</i> = 110)	Dependence ( <i>N</i> = 112)	Total ( <i>N</i> = 268)	<i>P</i> Value
Too demanding (Yes %)	13 (28.3)	35 (31.8)	43 (38.4)	91 (33.6)	NS
Too many responsibilities to enter (Yes %)	22 (47.8)	63 (56.3)	148 (55.2)	148 (55.2)	NS
Hard to resist where currently live (Yes %)	12 (26.1)	43 (39.1)	47 (42.0)	102 (38.1)	NS
Old friends may urge to use (Yes %)	21 (45.7)	61 (55.5)	79 (70.5)	161 (60.1)	**
Treatment just doesn't work (Yes %)	6 (13.0)	22(20.0)	25 (22.3)	53 (19.8)	NS

\*\* *P* < .01



